

Claims:

1. A system for remediation of contaminated soil, comprising:
a soil remediation cell of contaminated soil; and
5 a plurality of multi-functional conduits located within said
contaminated soil, each said multi-functional conduit defining a reaction
housing,
said multi-functional conduits including (a) heating elements for
introducing heat into the contaminated soil for volatilizing the contaminants
10 located within the contaminated soil, without utilizing mechanically driven
forced air, thereby producing a contaminated vapor, (b) flow channels
extending therethrough for removing said contaminated vapor from within
said soil remediation cell, and (c) said reaction housing wherein a substantial
portion of the contaminants in said contaminated vapor are destroyed so as to
15 produce a substantially non-contaminated vapor in which at least about 80%
by weight of said contaminants have been destroyed.
2. The system of claim 1, wherein each said multi-functional
conduit has a perforated portion comprising a plurality of perforations and a
non-perforated portion, respectively.
- 20 3. The system of claim 2, wherein said non-perforated portion
defines said reaction housing.
4. The system of claim 1, wherein the non-contaminate vapor
does not include substantially any nitrogen oxides.
5. The system of claim 1, wherein the non-contaminate vapor is
25 capable of being introduced directly into the atmosphere surrounding said soil
remediation cell.
6. The system of claim 1, which does not include any additional
recovery equipment to destroy said contaminants.

7. The system of claim 1, which does not include incineration of said substantially non-contaminated vapor.

8. The system of claim 1, wherein the non-contaminate vapor does not include more than about 0.01% of nitrogen oxides.

5 9. The system of claim 1, wherein at least about 85% by weight of said contaminants have been destroyed.

10. The system of claim 1, wherein at least about 90% by weight of said contaminants have been destroyed.

10 11. The system of claim 1, wherein at least about 95% by weight of said contaminants have been destroyed.

12. The system of claim 2, wherein the contaminated vapors flow into and through the perforated portion and into the non-perforated portion.

13. The system of claim 2, wherein said perforated portion is joined to the outer surface of said non-perforated portion, an opening being
15 defined between the perforated portion and the non-perforated portion to facilitate the flow of said contaminated vapors from said perforated portion to said non-perforated portion.

14. The system of claim 13, wherein said opening in the center portion of said multi-functional conduits.

20 15. The system of claim 1, wherein the contaminated vapors moves into and through the perforated portion and into the non-perforated portion, due to a pressure differential created by the heat introduced into, and generated within, the contaminated soil.

16. The system of claim 2, wherein said perforated portion
25 comprises a perforated tube and said non-perforated portion comprises a non-perforated tube.

17. The system of claim 1, wherein said multi-functions conduits comprise an expansion portion located adjacent to one end thereof.

18. The system of claim 1, wherein the contaminated soil is heated to an average temperature greater than about 212 degrees F.

19. The system of claim 1, wherein the contaminated soil, after removing said contaminated vapor from within said remediation cell, has an average moisture level of not more than about 5% by weight.

20. The system of claim 1, wherein the amount of contaminated vapor that flows from the multi-functional conduits into the reaction housing is controlled by the amount of said heat introduced into said contaminated soil.

21. The system of claim 1, wherein said heat is produced by an electrical current.

22. The system of claim 1, wherein the contaminated vapor is destroyed within the confines of said remediation cell.

23. The system of claim 1, wherein said contaminated vapors are not recirculated to said soil remediation cell.

24. The system of claim 1, which has a sound level and a dust level in the area of the remediation cell which are substantially reduced due the absence of substantial equipment in the system having moving mechanical parts.

25. The system of claim 1, wherein a substantial constant level of soil remediation is maintained in the system due to either a substantially fixed heat introduction rate or a substantially fixed heat temperature.

26. The system of claim 1, wherein said remediation cell is multi-layered and formed of a plurality of adjacent layers of contaminated soil, and a plurality of multi-functional conduits are located between the adjacent layers of contaminated soil.

27. The system of claim 1, wherein multi-functional conduits are arranged in a substantially horizontal plane with respect to the horizontal axis of said remediation cell.

28. The system of claim 1, which further includes a high temperature covering.

29. The system of claim 1, wherein said remediation cell soil and said plurality of multi-functional conduits are located within a structural enclosure.

30. The system of claim 29, wherein said structural enclosure defines an open bottom to facilitate removal of the non-contaminated soil.

31. The system of claim 30, wherein said structural enclosure includes support members for maintaining the integrity of the structural enclosure during soil removal.

32. The system of claim 1, wherein said structural enclosure comprises a trailer.

33. The system of claim 30, wherein said multi-functional conduits are connected to said structural enclosure.

34. The system of claim 1, wherein a vapor space is provided above said soil remediation cell.

35. The system of claim 34, wherein said vapor space comprises a steam vapor space which, during remediation of said contaminated soil, provides a path for the vapors in this space to migrate into the multi-function conduits.

36. The system of claim 35, wherein a substantial amount of the contaminated vapors are destroyed within the low pressure dehydrated soil prior to entering the multi-functional conduits.

37. The system of claim 30, wherein said structural enclosure is insulated.

38. The system of claim 30, wherein said structural enclosure is stackable onto another structural enclosure.

39. A method for remediating contaminated soil, comprising:
forming a soil remediation cell of contaminated soil, and a plurality of
multi-functional conduits located within said contaminated soil, each said
multi-functional conduit defining a reaction housing;
5 introducing substantial heat from said multi-functional conduits into
the contaminated soil and volatilizing the contaminants located within the
contaminated soil, without utilizing mechanically driven forced air, thereby
producing a contaminated vapor;
removing said contaminated vapor from within said contaminated soil
10 through flow channels within said multi-functional conduits;
introducing said contaminated vapor into said reaction housing; and
destroying a substantial portion of the contaminants in said
contaminated vapor within the reaction housing so as to produce a
substantially non-contaminated vapor in which at least about 80% by weight
15 of said contaminants have been destroyed.
40. The method of claim 39, wherein each said multi-functional
conduit has a perforated portion comprising a plurality of perforations
forming flow channels for removing said contaminated vapor, and a non-
perforated portion defining said reaction housing.

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